Science Fair and Beyond :

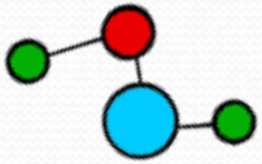
Selecting Excellent Science Books for Children and Teens

Erin O'Toole, Science and Technology Librarian,
UNT Libraries

"Selecting the Right Stuff," NETLS Symposium,
August 14, 2009

Why is she here?

- Master's degree in Molecular Biology



- Five years' experience in public libraries
- Selector for Juvenile Collections at UNT Libraries
- Research interest in science fair reference and collection development

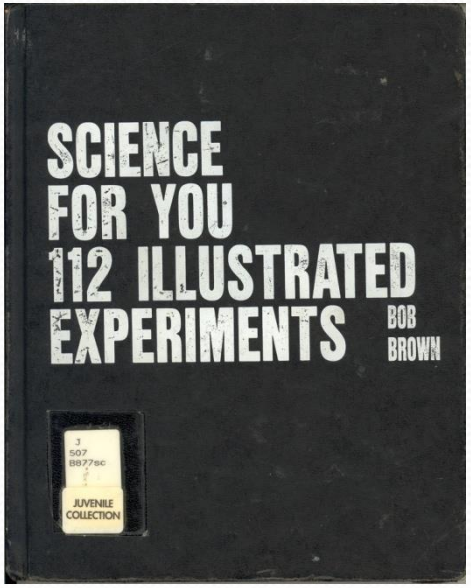
Research question:

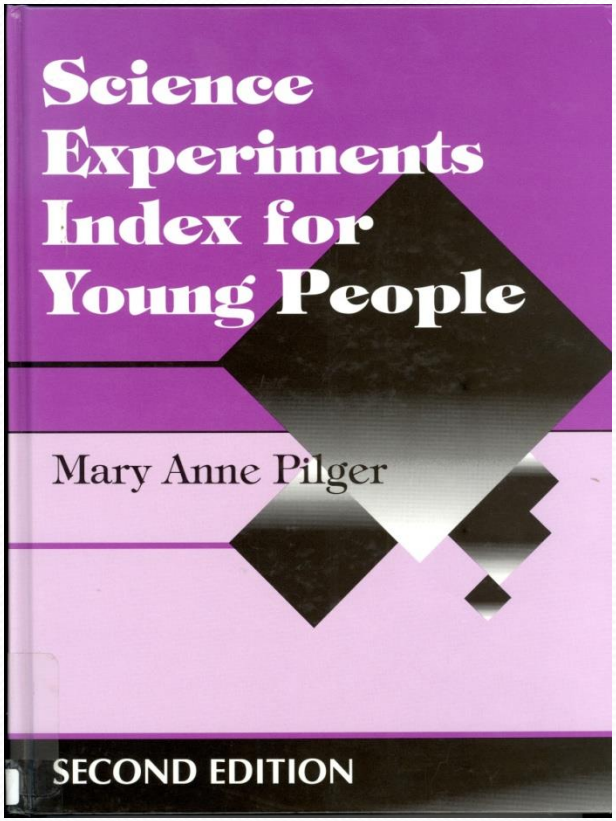
What percentage of parents do their children's science fair projects for them?

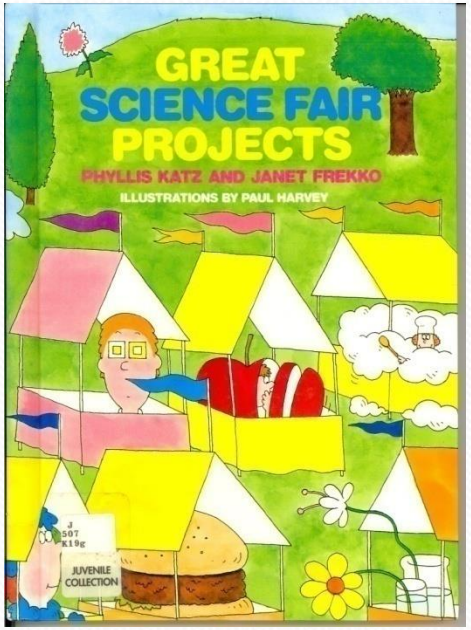
The Game Plan

- Changes in science fair environment and their impact on collection development
- Qualities of an excellent nonfiction book, specifically science books
- Selection tools for finding excellent science books
- Erin's favorite science books and publishers

Do you recognize these?







You don't have to spend all of your science fair money on them anymore!

Changes in Science Fair Land

- Experiments are more readily available - Internet, PTA, teachers and school librarians
- Students mainly looking for background information – section of scientific method.

Conclusion: Don't put all of your money into experiment collections or indexes. You need good, basic science books.

Qualities of a good science book

=

Qualities of a good nonfiction book plus more

Qualities of Good Youth Nonfiction

Carter and Abrahamson

- Accuracy
- Content - defined
- Style – clarity, tone
- Organization - patterns
- Format - illustrations
- Uses – in schools and libraries

Cianciolo

- Accuracy and currency
- Starter, not stopper
- Distinguish between fact, theory, and opinion
- Clear text and illustrations
- Organization indicates patterns and interrelationships
- Attractive and readable format

Criteria for Good Science Books

- Currency
- Content
- Clarity
- Access
- Back matter
- Illustrations of the unseen

Criteria #1 and #2

Currency

- Will solve majority of accuracy problems
- Title should be no more than 5 years old
- Rely on reviewers for subject knowledge

Content

- Coverage should include at least all basic facts in a subject area
- Rely on reviewers for subject knowledge

Criteria #3: Clarity

- Explanations of concepts in jargon are not enough
- Need analogies and real-life examples
- Need illustrations that support and enhance text
- Look at reviews, catalogs (online or print), and conferences

cable 2.5 cm (1 in) in diameter can be used to lift more than 23,000 kg (50,000 lb or 25 tons).

Solids, such as wood, concrete, and steel, are used to build houses, skyscrapers, bridges, cars, and many other things. These structures are subject to stresses that tend to separate the atoms or molecules of which they are made. When you walk across a floor, there is a stress on it. Your weight tends to bend the floor. The many cars and trucks on a bridge tend to bend the bridge.

Solids are able to withstand stresses because they are elastic. They can be stretched, compressed, and bent because their molecules can be separated or pushed together by small amounts. The basic types of stress are compression, tension, bending, and shearing (see Figure 5).

- ✓ Compression is caused by forces that push inward on a structure. A vertical support column is an example of a structure being compressed.
- ✓ Tension occurs when forces tend to stretch a structure. The springs or cables that support a suspension bridge are examples of stress due to tension. Forces of tension can be found on the surface of liquids, as you will learn later. Such forces result in what is called *surface tension*.
- ✓ Bending is a combination of tension and compression. A beam supporting a load will bend. The top of the beam undergoes compression, while the bottom is stretched and so experiences tension.

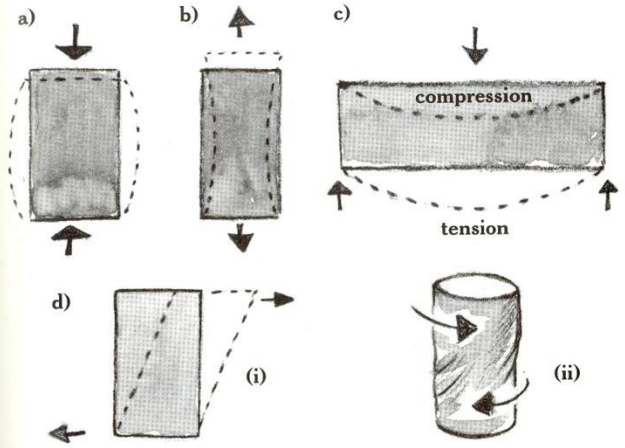


Figure 5.

EXAMPLES OF STRESS

a) compression; b) tension; c) bending; d) (i) shear; (ii) torsional (twisting) shear. The arrows show the direction of the forces that create the stress.

- ✓ Shearing arises when one part of a structure is pushed sideways relative to another part. A rivet holding two pieces of metal together experiences shear stress if the pieces of metal are pulled in opposite directions. Torsional shear occurs when twisting forces are applied. For example, you apply torsional shear when you open a bottle that has a twist-off cap.

From: *Science Fair Projects about the Properties of Matter Using Marbles, Water, Balloons and More* by Robert Gardner

Criteria #4 and #5

Access

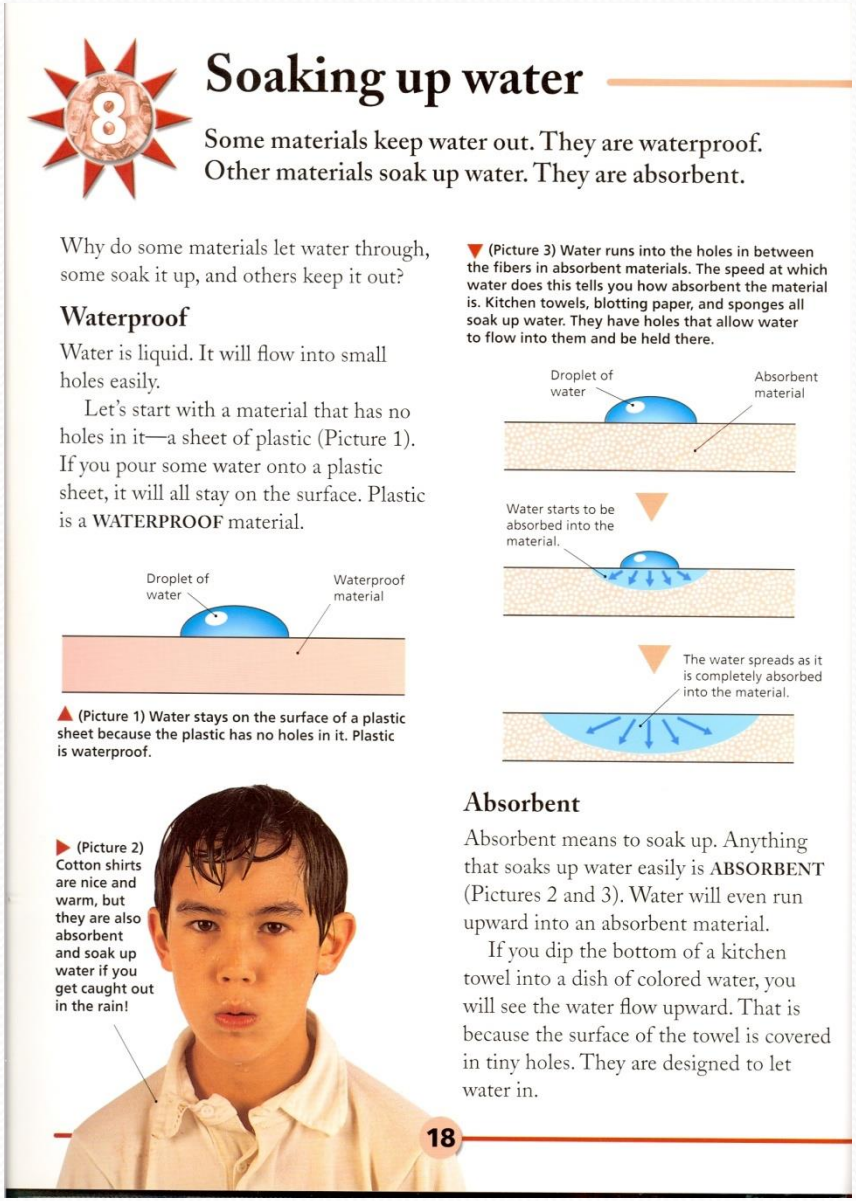
- Format should support efferent reading
- Students should be able to easily locate scientific concepts
- Descriptive chapter titles and subheadings
- Important terms in bold font or in sidebars
- Look at reviews, catalogs and conferences

Back Matter

- Supports efferent reading
- Starter, not stopper
- Leads student to deeper investigation , related topics, and different formats
- Indexes, glossary, further reading, websites
- Look at reviews, catalogs and conferences

Easy access to concepts and terminology

From: *Properties of Materials* by Dr. Brian Knapp. Science Matters! series



8

Soaking up water

Some materials keep water out. They are waterproof. Other materials soak up water. They are absorbent.

Why do some materials let water through, some soak it up, and others keep it out?

Waterproof

Water is liquid. It will flow into small holes easily.

Let's start with a material that has no holes in it—a sheet of plastic (Picture 1). If you pour some water onto a plastic sheet, it will all stay on the surface. Plastic is a **WATERPROOF** material.

▲ (Picture 1) Water stays on the surface of a plastic sheet because the plastic has no holes in it. Plastic is waterproof.

▼ (Picture 3) Water runs into the holes in between the fibers in absorbent materials. The speed at which water does this tells you how absorbent the material is. Kitchen towels, blotting paper, and sponges all soak up water. They have holes that allow water to flow into them and be held there.

▶ (Picture 2) Cotton shirts are nice and warm, but they are also absorbent and soak up water if you get caught out in the rain!

Absorbent

Absorbent means to soak up. Anything that soaks up water easily is **ABSORBENT** (Pictures 2 and 3). Water will even run upward into an absorbent material.

If you dip the bottom of a kitchen towel into a dish of colored water, you will see the water flow upward. That is because the surface of the towel is covered in tiny holes. They are designed to let water in.

Important Words

absorb take in

lens part of the eye; also glass that is made to refract light

light wave that travels through space

optical illusion trick played on our eyes by light

prism glass that can split light into colors

reflect bounce back

refract bend

retina back of the eye where light is focused

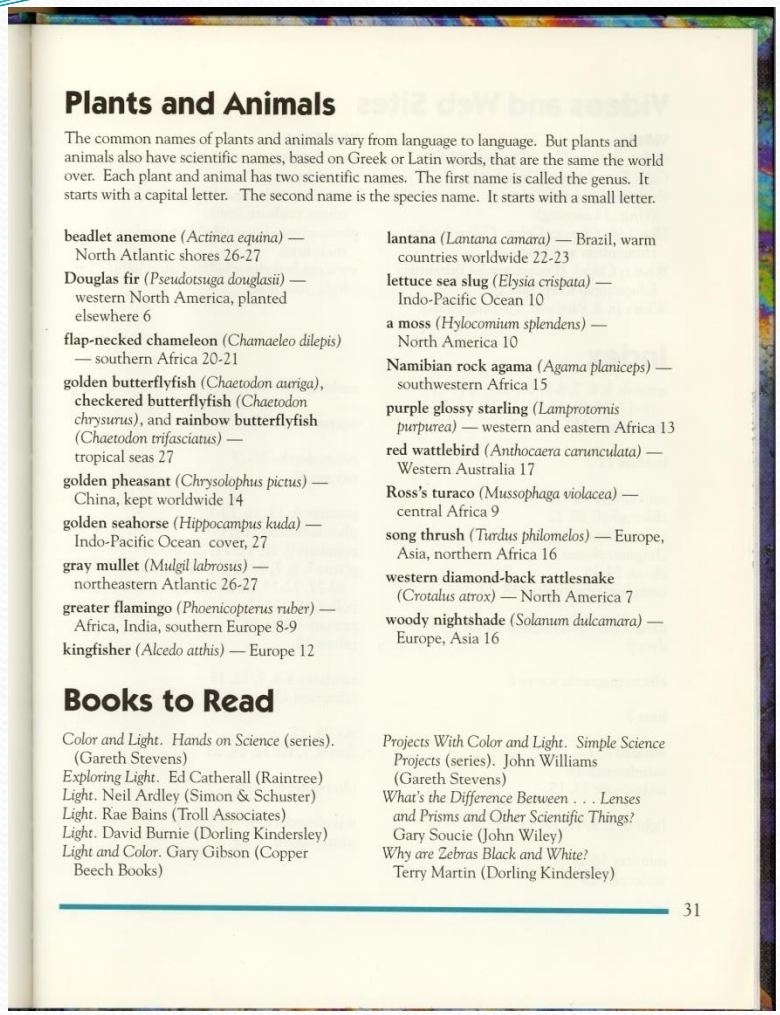
visible light light we can see

white light light made by mixing all the colors of light we see

Index

(**Boldface** page numbers indicate illustrations.)

From: *Experiments with Light* by Salvatore Tocci



Plants and Animals

The common names of plants and animals vary from language to language. But plants and animals also have scientific names, based on Greek or Latin words, that are the same the world over. Each plant and animal has two scientific names. The first name is called the genus. It starts with a capital letter. The second name is the species name. It starts with a small letter.

beadlet anemone (*Actinea equina*) — North Atlantic shores 26-27

Douglas fir (*Pseudotsuga douglasii*) — western North America, planted elsewhere 6

flap-necked chameleon (*Chamaeleo dilepis*) — southern Africa 20-21

golden butterflyfish (*Chaetodon auriga*), **checkered butterflyfish** (*Chaetodon chrysurus*), and **rainbow butterflyfish** (*Chaetodon trifasciatus*) — tropical seas 27

golden pheasant (*Chrysolophus pictus*) — China, kept worldwide 14

golden seahorse (*Hippocampus kuda*) — Indo-Pacific Ocean cover, 27

gray mullet (*Mulgil labrosus*) — northeastern Atlantic 26-27

greater flamingo (*Phoenicopterus ruber*) — Africa, India, southern Europe 8-9

kingfisher (*Alcedo atthis*) — Europe 12

lantana (*Lantana camara*) — Brazil, warm countries worldwide 22-23

lettuce sea slug (*Elysia crispata*) — Indo-Pacific Ocean 10

a moss (*Hylocomium splendens*) — North America 10

Namibian rock agama (*Agama planiceps*) — southwestern Africa 15

purple glossy starling (*Lamprotornis purpurea*) — western and eastern Africa 13

red wattlebird (*Anthocaera carunculata*) — Western Australia 17

Ross's turaco (*Mussophaga violacea*) — central Africa 9

song thrush (*Turdus philomelos*) — Europe, Asia, northern Africa 16

western diamond-back rattlesnake (*Crotalus atrox*) — North America 7

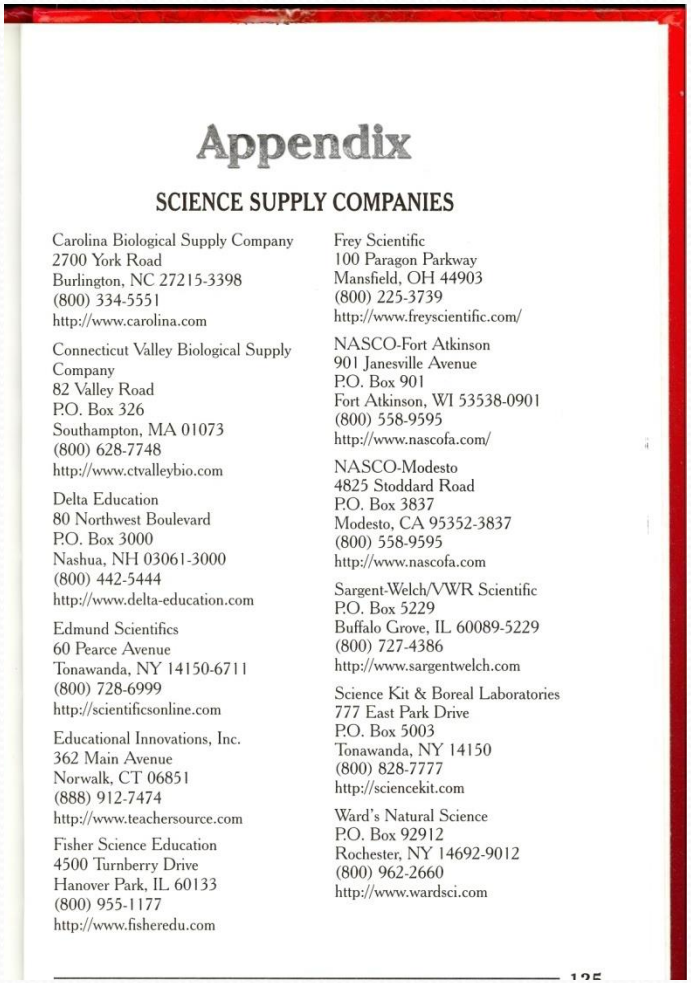
woody nightshade (*Solanum dulcamara*) — Europe, Asia 16

Books to Read

Color and Light. Hands on Science (series). (Gareth Stevens)
Exploring Light. Ed Catherall (Raintree)
Light. Neil Ardley (Simon & Schuster)
Light. Rae Bains (Troll Associates)
Light. David Burnie (Dorling Kindersley)
Light and Color. Gary Gibson (Copper Beech Books)
Projects With Color and Light. Simple Science Projects (series). John Williams (Gareth Stevens)
What's the Difference Between . . . Lenses and Prisms and Other Scientific Things? Gary Soucie (John Wiley)
Why are Zebras Black and White? Terry Martin (Dorling Kindersley)

31

From: *The Nature and Science of Color* by Jane Burton and Kim Taylor



Appendix

SCIENCE SUPPLY COMPANIES

Carolina Biological Supply Company
2700 York Road
Burlington, NC 27215-3398
(800) 334-5551
http://www.carolina.com

Connecticut Valley Biological Supply Company
82 Valley Road
P.O. Box 326
Southampton, MA 01073
(800) 628-7748
http://www.ctvalleybio.com

Delta Education
80 Northwest Boulevard
P.O. Box 3000
Nashua, NH 03061-3000
(800) 442-5444
http://www.delta-education.com

Edmund Scientifics
60 Pearce Avenue
Tonawanda, NY 14150-6711
(800) 728-6999
http://scientificsonline.com

Educational Innovations, Inc.
362 Main Avenue
Norwalk, CT 06851
(888) 912-7474
http://www.teachersource.com

Fisher Science Education
4500 Turnberry Drive
Hanover Park, IL 60133
(800) 955-1177
http://www.fisheredu.com

Frey Scientific
100 Paragon Parkway
Mansfield, OH 44903
(800) 225-3739
http://www.freyscientific.com/

NASCO-Fort Atkinson
901 Janesville Avenue
P.O. Box 901
Fort Atkinson, WI 53538-0901
(800) 558-9595
http://www.nascofa.com/

NASCO-Modesto
4825 Stoddard Road
P.O. Box 3837
Modesto, CA 95352-3837
(800) 558-9595
http://www.nascofa.com

Sargent-Welch/VWR Scientific
P.O. Box 5229
Buffalo Grove, IL 60089-5229
(800) 727-4386
http://www.sargentwelch.com

Science Kit & Boreal Laboratories
777 East Park Drive
P.O. Box 5003
Tonawanda, NY 14150
(800) 828-7777
http://sciencekit.com

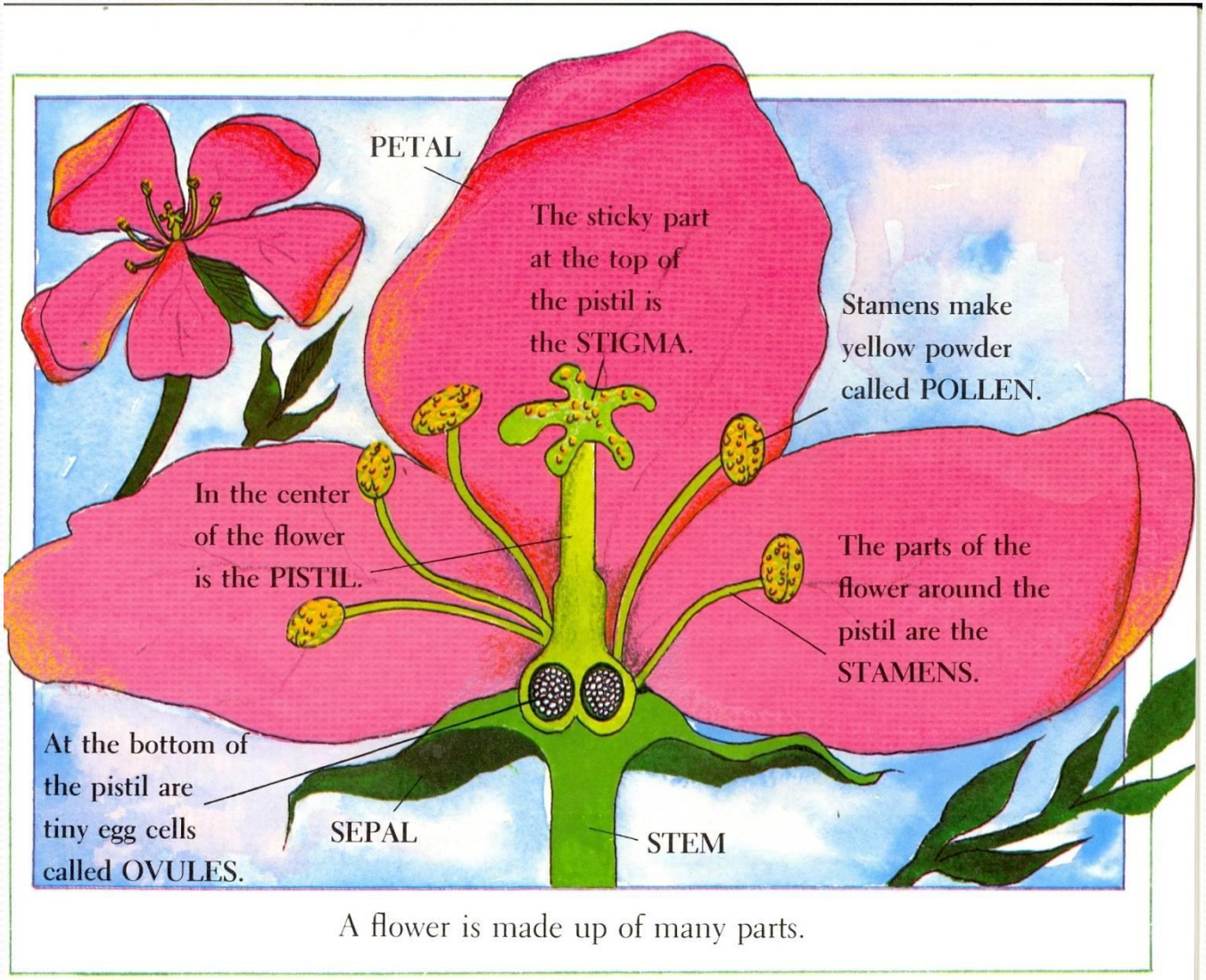
Ward's Natural Science
P.O. Box 92912
Rochester, NY 14692-9012
(800) 962-2660
http://www.wardsci.com

125

From: *Science Fair Projects about the Properties of Matter Using Marbles, Water, Balloons and More* by Robert Gardner

#6: Illustrations of the Unseen

- Lead students from awe to analysis
- Reveal the hows and whys of physical matter and living beings
- Reveal the intricacies of the everyday
- Model the skill of modeling
- Support different learning styles
- Cross-sections, chronologies, diagrams, visualization of forces



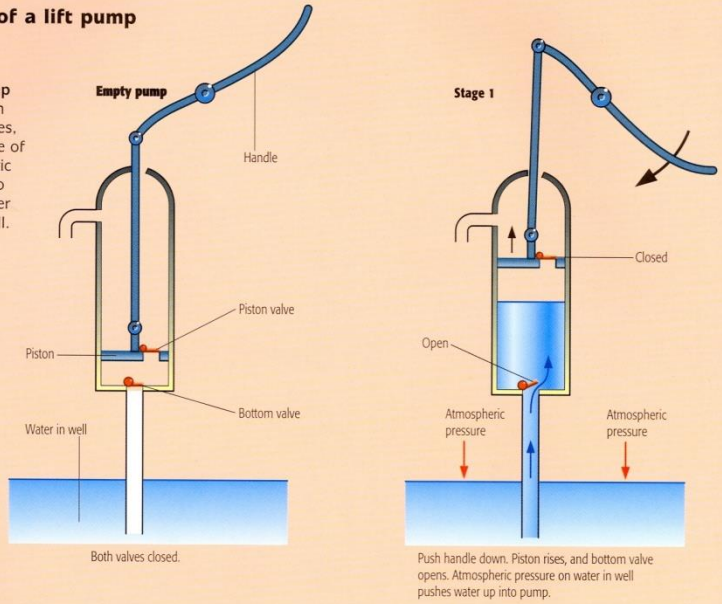
A flower is made up of many parts.

From: *From Seed to Plant* by Gail Gibbons

Water pressure

Action of a lift pump

A lift pump operates in three stages, making use of atmospheric pressure to pump water from a well.



The lift pump

This type of pump gets its name because it was originally used for lifting water from a well or a stream. It works in three stages. The first illustration above shows the empty pump before it is used. In the first stage (second illustration) the handle is pushed down. This raises the piston, while the valve in the piston remains closed. Atmospheric pressure pushing on the surface of the water in the well forces water up the pipe, past the open lower valve, and into the barrel of the pump.

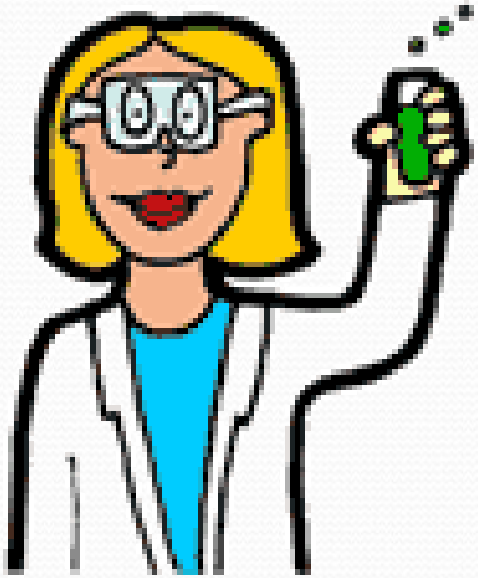
In the second stage, with the barrel full of water, the handle is lifted up. This causes the piston to descend with its valve open. The lower valve remains closed. In this stage the water itself does not move—the piston moves through the water.

In the third and final stage the handle is pushed down again. The piston rises, with its valve closed, and lifts the water to the top of the barrel and out of the pump. At the same time, the lower valve opens, and atmospheric pressure forces more water into the pump (repeating stage 1). Water will continue to flow as long as the handle is pumped up and down.

From: *Force and Pressure* by John O.E. Clark.
Series: *Under the Microscope: Science Tools.*

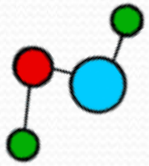
Science Book Selection Tools

The Answer for the Busy Librarian



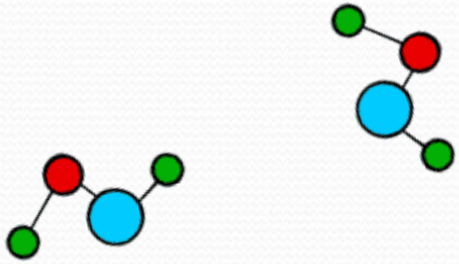
Selection Tools: Journals

- *Science Films and Books* - published by the American Association for the Advancement of Science
- *School Library Journal* - for sheer number of nonfiction reviews
- *Booklist* – for series reviews

Selection Tools: Awards

- Best Books for Children (*SB&F*)
- Best Books for Junior and Senior High Readers (*SB&F*)
- Orbis Pictus Nonfiction Award (NCTE)
- Outstanding Science Trade Books for Children (NSTA)



Erin's Favorites for Reference

- *World Book Encyclopedia*
- *Physics Matters!* - Grolier
- *Science Matters!* - Grolier
- *Young Scientist* – World Book

Favorite Series and Publishers

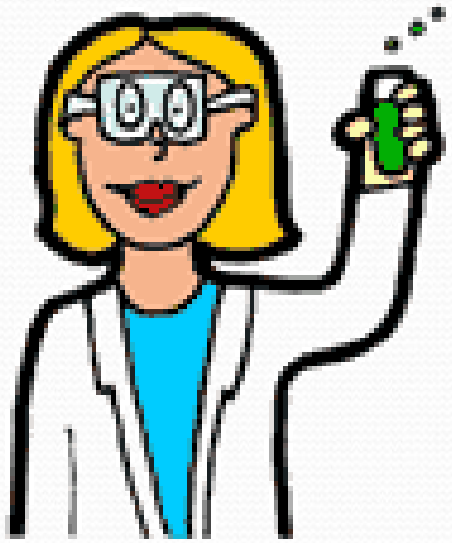
- Chelsea House – *Science Foundations*
- Compass Point Books – *Simply Science*
- Children's Press – *Elements, Science Experiments*
- Grolier Educational – *Under the Microscope: Science Tools*
- Heinemann Library – *Useful Machines*
- National Geographic – *Science Readers*

Favorite Authors

- John O.E. Clark – *Under the Microscope: Science Tools*
- Gail Gibbons – You name it!
- Dr. Brian Knapp – *Science Matters!*
- Salvatore Tocci – *Elements* and *Science Experiments* from Children's Press
- Mike Dickinson – *Science Project Helper*

And Beyond: Science Literacy

- Basic science books provide:
  - principles and rules of science
  - introduction to science research
  - introduction to scientific method
- Supplement with:
  - books about scientists at work, e.g. *The Snake Scientist*
  - books with a more narrative structure that entice students to learn more about science, e.g. *The Man-Eating Tigers of the Sundarbans*



Thank you for listening!

Questions?

You can contact me at:
erin.otoole@unt.edu
940-891-6750